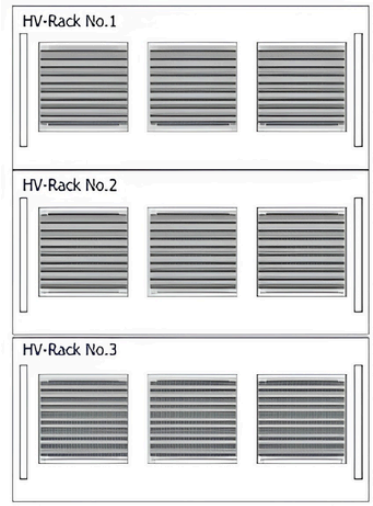
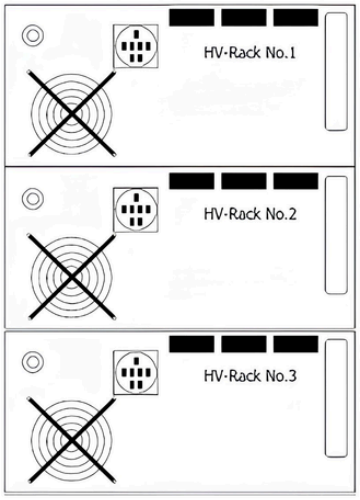
MAGNETRON GENERATOR

30 kW 915 MHz

:fm





GENERAL INFORMATION OF POWER SUPPLY

The BPA30kW air-cooled Switched Mode Power Supply (SMPS) is suitable for running a 30 kW/915 MHz magnetron. This power supply is designed based on high modular technology with reduced input and output ripple as well as having the ability to protect the magnetron from over voltage and over current.

The BPA30kW autonomously manages the operating status of the magnetron and adjusts the filament voltage and E-Magnet according to the input power of the magnetron and switches off the output when alarm events such as overcurrent or overvoltage of the magnetron occur. Redundant Fail-Safe Design: Due to the high modular design of this power supply system, its reliability is very high, so that even if one module fails, the power supply system can continue to emit microwaves. This SMPS includes 3 identical, self-ventilated 19” aluminum enclosures with 5 height units.

FEATURES

- Air cooling
- Accurate anodic voltage and anodic current measurement and control
- Cutting edge resonance switching topology
- Protections: Over temperature/ Over current/ Overvoltage/ Over load/ Under voltage/ Under load/ Short circuit
- High reliability (designed based on MIL-HDBK-338B and MIL-HDBK-217 standards)
- Low noise SMPS
- Constructed using high quality power electronics and mechanical components all provided in Germany
- High reliability, fault-tolerant design, and uptime through modular, (no single point of failure)
- Seamless operation under failure: automatic fault detection and load redistribution ensure uninterrupted output
- Fast maintenance with module replacement less than 5 minutes
- Very high efficiency (up to 97%) with low ripple, improving magnetron lifetime, and air-cooled system
- Flexible operation: compatible with different magnetron brands and adjustable from 3 kW to 30 kW in 0.5 kW steps
- Advanced control & integration: options for selecting the industrial communication protocols for control and monitoring the magnetron using PROFINET, EtherCAT, and Modbus TCP

SPECIFICATION ELECTRICAL AND TECHNICAL DATA

	BPA30kW400	BPA30kW480	BPA30kW600	BPA30kW690
Input voltage (Three phase)	400 V_{AC} ± 10 %	480 V_{AC} ± 10 %	600 V_{AC} ± 10 %	690 V_{AC} ± 10 %
Efficiency	up to 96 %	up to 96 %	up to 97 %	up to 97 %
Input frequency	47 Hz to 63 Hz			
Output voltage adaptivity	11 kV-13 kV			
Anode current variation range	300 mA to 3000 mA			
Absolute Max. output power	42 kW			
Output voltage ripple	Less than 1 %			
Anode current ripple	Less than 2 %			
Active operating temperature	-20 °C to 50 °C			
Working humidity	20 % ~ 90 % RH non-condensing			
Storage temperature, humidity	-30 °C ~ +70 °C, 10 % ~ 95 % RH non-condensing			
Withstand voltage	20 kV			
Dimension	744 mm × 670 mm × 483 mm			

© 2026 Fricke und Mallah Microwave Technology GmbH
Technical modifications reserved

:fm
Fricke und Mallah Microwave Technology GmbH
Werner-Nordmeyer-Str. 25 I 31226 Peine I Germany
Tel.: +49 (0) 5171 54 57-0 I Fax: +49 (0) 5171 54 57-26
info@microwaveheating.net I www.microwaveheating.net

MAGNETRON GENERATOR

30 kW 915 MHz

GENERAL INFORMATION OF MAGNETRON HEAD

The magnetron utilized as the microwave power generation core of the system is a continuous-wave (CW) device operating at 915 MHz, with a nominal output capability of up to 30 kW. Microwave energy is coupled via an axial antenna into the waveguide, forming the primary source for the downstream thermal process. The magnetron is driven by a 30 kW modular switched-mode power supply (SMPS), which delivers a regulated anode voltage in the range of approximately 11 kV–13 kV and employs adaptive control of the anode current, filament voltage, and electromagnet field to precisely establish and maintain the desired operating point.

In this system architecture, the SMPS extends beyond a conventional power conversion role and acts as the central supervisory controller. It performs continuous high-resolution monitoring of critical electrical parameters, particularly anode voltage and current, and enforces fast-acting protection schemes against overcurrent, overvoltage, and abnormal operating conditions. This integrated control and protection strategy ensures high operational stability while significantly enhancing magnetron lifetime and reliability. Moreover, the inherently modular and fault-tolerant design of the power supply enables continued system operation at a derated power level in the event of individual module failure, thereby preserving process continuity, while the magnetron remains the primary microwave energy source within the thermal application.

FEATURES

- High-efficiency microwave generation (≈85%) at 915 MHz ISM frequency band
- Continuous wave (CW) operation enabling stable and uniform thermal processing
- Fully compatible with modular SMPS architecture for adaptive power control (3–30 kW)
- Robust metal-ceramic construction for high thermal and electrical stability
- Direct-heated tungsten cathode ensuring reliable electron emission and long operational life
- Fast and precise power controllability via coordinated adjustment of anode current and magnetic field
- Optimized for closed-loop operation with high-resolution monitoring of anode voltage and current
- Designed for integration with advanced protection systems (overvoltage, overcurrent, arc and fault conditions)
- Stable operation under varying load conditions with defined VSWR tolerance
- Dual cooling concept (water-cooled anode, forced-air cathode/output window) for effective thermal management
- External electromagnet configuration allowing flexible control of operating point
- Industrial-grade reliability suitable for continuous high-power applications
- Compatible with fault-tolerant power supply system enabling derated operation under module failure

SPECIFICATION ELECTRICAL AND TECHNICAL DATA

Parameter	Value
Operating Mode	Continuous Wave (CW)
Efficiency	up to 85 %
Frequency	915 MHz ± 10 MHz
Nominal Output Power	up to 30 kW
Structure	Metal- ceramic
Anode Voltage (typ.)	12.5 kV
Anode Voltage (max.)	14 kV
Anode Current (typ.)	up to 2.8 A
Anode Input Power	up to 35 kW
Filament Voltage	12.6 V ± 1.2 V
Filament Current (operation)	95 A –100 A
Load VSWR	≤1.2 @ 30 kW
Cooling – Anode	Water- cooled
Water Flow Rate	≥ 8 L/min
Cooling – Cathode / Output Window	Forced air
Electromagnet Cooling	Water- cooled
Typical Magnet Current	---

© 2026 Fricke und Mallah Microwave Technology GmbH
Technical modifications reserved

Fricke und Mallah Microwave Technology GmbH
Werner-Nordmeyer-Str. 25 I 31226 Peine I Germany
Tel.: +49 (0) 5171 54 57-0 I Fax: +49 (0) 5171 54 57-26
info@microwaveheating.net I www.microwaveheating.net